



THE NORTHEAST WILDLIFE DISEASE COOPERATIVE

<http://sites.tufts.edu/nwdc>

Mange

Other Names: Scabies, Red mange

Cause

Mange is a highly contagious skin disease of mammals caused by mites. There are three major categories of mange that affect wild mammals that are caused by different species of mites. These three categories are sarcoptic mange, which is caused by *Sarcoptes scabiei*, notoedric mange, which is caused by *Notoedres centrifera*, and demodectic mange, which is caused by two species of mites from the genus *Demodex*. Sarcoptic mange is most common and most studied in wildlife and will thus be the focus of this disease description. Demodectic and notoedric mange will be addressed occasionally when information is available. A fourth form of mange is caused by a mite from the genus *Ursicoptes*, though it is not considered an important source of disease.

Significance

Mites that cause sarcoptic mange are adapted to infect specific hosts, though they can also temporarily infect other species. There is a specific human-adapted variety of *S. scabiei* that causes scabies in people. Occasionally, humans can become infected with animal varieties of *S. scabiei* and may develop a short-lived (10-14 days), self-limiting infection. Animal handlers, slaughterhouse workers, wildlife biologists, veterinarians, wildlife rehabilitators, researchers, trappers, and pet owners are at greater risk of contracting scabies from an infected animal. Sarcoptic mange has led to declines in fox populations in some areas of the United States and Europe.

Notoedric mange does not infect humans. *Demodex* mites are also species specific and are a normal inhabitant of the skin of all mammals. Occasionally there can be moderate to severe hair follicle damage and hair loss associated with disease caused by *Demodex* mites.

Species Affected

Sarcoptic mange has been reported in over 100 species of wild and domestic mammals. In North America, sarcoptic mange is often reported in wild canids such as red foxes, coyotes, gray wolves, and red wolves. Sarcoptic mange has also been reported in black bears, porcupines, rabbits, squirrels, and raccoons.

Notoedric mange is known to occur in the western gray squirrel, eastern gray squirrel, and fox squirrel. Though *Notoedres centrifera* is generally host specific to squirrels, it has recently been found to be the cause of a population decline in bobcats in several counties in California.

There are many different species of *Demodex* mites that are host specific, though some *Demodex* species can infect additional species of closely related mammals. Demodectic mange has been reported in many mammalian species including white-tailed deer, mule deer, and elk.

Distribution

Sarcoptic, notoedric, and demodectic mange are all distributed worldwide.

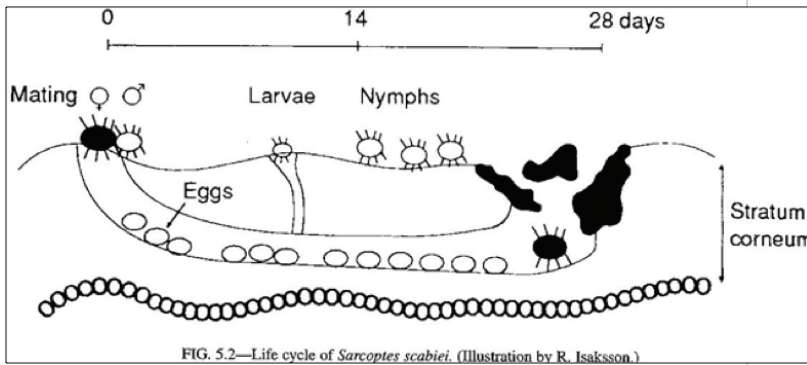


Image from Bornstein et al. 2001

Transmission

Sarcoptic mange mites burrow and form tunnels in the outer layer of the skin. Female mites lay their eggs within these tunnels and within 3 days, the eggs hatch into larvae. The larvae then either move to the surface of the skin or remain in the tunnels. In 3-4 days, the larvae develop into nymphs, which either remain in the tunnels, wander onto the surface of the skin, or create new tunnels. The nymphs develop into adults within 5-7 days. Mites are transferred to a new host when they come into direct physical contact with an uninfected host. Larvae and nymphs wandering on the surface of the skin can also fall off and survive in the environment for several weeks under ideal conditions (high humidity and low temperature prolongs survival outside of the host). A new host can become infected by coming into contact with an environment contaminated with these free-living mites. This often happens when animals share nests and burrows. The life cycle and transmission of notoedric mites are similar to those of sarcoptic mites.

Demodex mites are different in that they inhabit hair follicles and associated glands. Females lay eggs within the hair follicle that develop into larvae, nymphs, and then adults. A single follicle may contain many mites at various different stages in their life cycle. *Demodex* mites are likely transmitted from a mother to her young during times of close physical contact such as nursing and grooming.

Clinical Signs

Animals with sarcoptic mange will often exhibit hair thinning and loss. The skin becomes thickened, wrinkled, and covered in scabs and foul-smelling crusts due to overgrowths of normally occurring bacteria and yeasts. Skin

lesions can involve the entire body, though the ears and face are most commonly affected. Severely affected animals may become emaciated, depressed, lethargic, and may lose their fear of humans. When the skin around the eyes, mouth, and ears is involved, animals may experience blindness, difficulty eating, and hearing loss.



Juvenile red fox with severe sarcoptic mange. Photograph by Karen Donahue, CVT

Red foxes are typically the most severely affected wild species and often die of this disease. Severely affected bears will typically not den.

Squirrels with notoedric mange experience hair loss that may affect nearly the entire body. Crusts do not form.

Demodex mites do not usually cause clinical illness in otherwise healthy animals. Clinical signs of demodectic mange occur in animals that are suffering from poor nutrition, concurrent disease, or a weakened immune system. Similar to the other forms of mange, animals with demodectic mange can experience mild to moderate hair loss with dry, flakey, thickened skin. Larger species of *Demodex* may cause similar but more severe disease. Animals may also be in poor body condition.

Diagnosis

A diagnosis is reached by microscopic identification of the mites in skin scrapings, though clinical signs may be diagnostic in some cases. Deeper skin scrapings may be necessary to diagnose demodectic mange. Sarcoptic and notoedric mites are round with short, stubby legs, while demodectic mites are cigar shaped.

Treatment

Medications are available that can be used to successfully treat mange, but they are not commonly used in free-ranging wildlife. Many affected animals will resolve their mange without intervention if their immune systems function normally.

Management/Prevention

Management of mange in wild populations by reducing the number of infected animals through hunting may not be effective because the mites are likely widespread before animals are recognized with clinical illness. However, it is thought that mange is more likely to become established in high-density populations. Mange is a naturally occurring, common disease of wildlife, which makes control difficult. People handling mangy animals should wear gloves and should wash thoroughly immediately after handling. Infected carcasses should be frozen prior to examination, as sufficient freezing will kill the mites.

Suggested Reading

- Bornstein, S., T. Mörner, and W. M. Samuel. 2001. *Sarcoptes scabiei* and Sarcoptic Mange. Pages 107-119 in W. M. Samuel, M. J. Pybus, and A. A. Kocan, editors. Parasitic Diseases of Wild Mammals. Iowa State University Press, Ames, Iowa, USA.
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- Desche, C. E., J. J. Andrews, L. A. Baeten, Z. Holder, J. G. Powers, D. Weber, and L. R. Ballweber. 2010. New Records of Hair Follicle Mites (Demodecidae) from North American Cervidae. *Journal of Wildlife Diseases* 46: 585-590.
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- Taylor, M. A., R. L. Coop, and R. L. Wall. 2007. *Veterinary Parasitology*, Third Edition. Blackwell Publishing, Ames, Iowa, USA.